

## CASE REPORTS

# Postrauumatic popliteal pseudoaneurysm from femoral osteochondroma: Case report and review of the literature

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Osteochondroma is the most frequent bone tumor and can be responsible for vascular complications. The case of an 14-year-old boy with a popliteal pseudoaneurysm after a blunt trauma is presented. The diagnosis and treatment of this condition is discussed, and the English-language literature is reviewed. (*J Vasc Surg* 2003;37:669-71.)

Osteochondroma is the most frequent benign tumor of the bone.<sup>1,2</sup> It appears in adolescence and rarely can produce vascular complications. It may present with thrombosis, embolism, arteriovenous fistulae, or the development of pseudoaneurysms, with only 40 cases described in the literature.<sup>2-20</sup> The pathogenesis and development of the tumor are unknown because it is usually not detected until secondary symptoms appear.<sup>3</sup>

Pseudoaneurysms of the popliteal artery are much less common than true aneurysms in this location. Rarely, blunt trauma may result in pseudoaneurysm formation, but this can be related to an anatomic abnormality, as in the case of an osteochondroma, as we report.

### CASE REPORT

A 14-year-old boy was seen in our hospital with acute pain and sudden development of a pulsatile mass in the internal side of the right calf after a blunt trauma during a soccer game 2 days previously. A 10 cm-diameter painful and pulsatile mass was found in the right popliteal fossa, with distal edema and limitation to physical activity. Neither sensory nor motor deficits were found, and peripheral pulses were present. Single radiograph showed a spiked bone tumor, identified as an osteochondroma in the distal metaphysis of the femur (Fig 1). CT scan revealed the shape of a popliteal artery pseudoaneurysm (Fig 2) and its close relationship with the bone. Arteriogram showed a contrast jet into a pseudoaneurysm arising from the anterior surface of the popliteal artery (Fig 3).

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Because of the fast growth of the mass, surgery was indicated. We used a posterior approach and found a 6-cm × 4-cm pseudoaneurysm developed from a 1-mm hole in the anteromedial side of the popliteal artery with an external diameter of 5 mm, closely related to a spike of the femoral osteochondroma, covered by cartilaginous tissue. Local thrombus was removed after clamping of the artery and opening of the pseudoaneurysm. Distal embolectomy was not necessary. The artery was repaired with a 6/0 polypropylene primary suture, and the exostosis was completely removed after vascular repair. Pathologic examination of the resected bone confirmed the diagnosis of osteochondroma. Recovery was successful, and the patient was discharged from the hospital 5 days after surgery. The patient remains asymptomatic after 3 years of follow-up.

### DISCUSSION

Osteochondromas are bone tumors developed during adolescence and located in bone metaphysis, most frequently in the distal femoral one.<sup>1,2</sup> They can develop calcified spikes and have a small percentage of multicentricity. These tumors are usually asymptomatic and can be found on plain radiographs as casual findings. Complications occur in 4% of the osteochondromas as neurologic compromise, growth abnormality, or malignant degeneration to chondrosarcoma. Rarely, some osteochondromas can produce a vascular complication, more frequently next to long bones, as occurred in this patient, affecting arteries in up to 91% of the cases, with false aneurysm the most frequent lesion.<sup>5</sup>

The age of presentation of vascular complications is in the second decade of the life, and it is related to ossification of the cartilage cap of the osteochondroma, present during the growth period. As soon as growth ceases, the cartilage cap begins its ossification and it becomes a spike.<sup>3</sup> As the popliteal artery is fixed in the Hunter's canal and in its trifurcation, local compression of the artery by an osteochondroma can stretch the vessel with the appearance of a pseudoaneurysm.<sup>9</sup> We think that the continuous rubbing



Fig 1. Plain radiograph shows osteochondroma of distal femur.

of the artery against the exostosis during normal movement or a local trauma, as occurred in our patient, can damage the wall and lead to rupture of the artery,<sup>6,9,15</sup> probably from a perforation of the wall.

Some authors<sup>11</sup> reported that local exostosis loses its cartilage cap before the development of the pseudoaneurysm, but this did not occur in our patient. Matsushita et al<sup>3</sup> described changes in the radiographic profile of the exostosis previous to exacerbation of the symptoms without trauma history, so they think the loss of the cartilage is from pressure necrosis of the exostosis induced by the enlarging pseudoaneurysm. In our case, the cartilage cap was intact, and we think pseudoaneurysm is directly related to the trauma because of its rapid development. On the basis of pathologic findings where no cartilage or only bits of it were present in the analyzed specimens, many authors think that the lack of the cartilage cap causes the aneurysm formation because of disruption of the artery by the sharp ossified tumor.<sup>10,12,14</sup> Controversy also exists between some authors who believe that related local trauma or a fracture can cause local loss of the cartilage, resulting in an irregular bone spike that can perforate the vessel,<sup>6,10</sup> and others who believe the changes in the exostosis can be caused by the pseudoaneurysm's growth itself.<sup>3</sup>

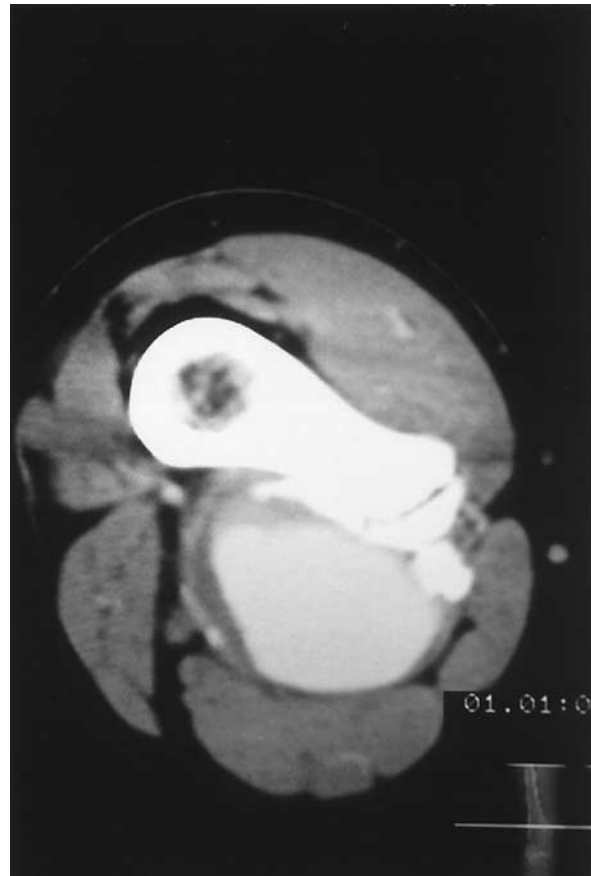
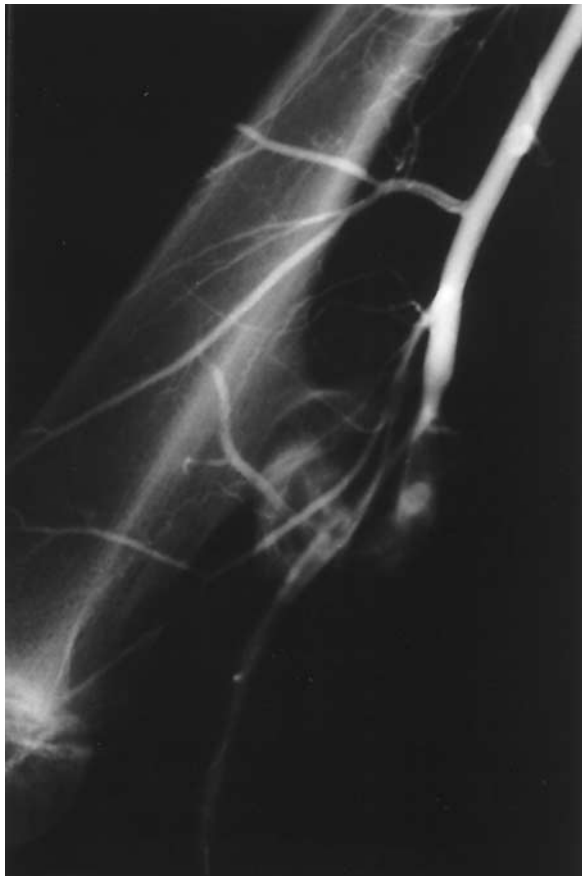


Fig 2. CT scan shows close relation between bone and pseudoaneurysm. Note spike (arrow) of tumor.

Because of the possibility of multicentricity of the exostoses in up to 10% of the patients, a general screening is mandatory,<sup>5</sup> basically with plain radiographs of the four limbs and the chest, where these tumors usually develop. However, Crandall et al<sup>16</sup> think that this step must be mandatory only in patients whose parents are affected.

A definitive inheritance pattern is seen for single autosomal dominant gene, and about half the progeny carry the gene and express it. There was a single exostosis in our patient, but 13 cases were reported previously of popliteal pseudoaneurysm with multiple exostoses, nine with a family component.<sup>2</sup> In the case of known multiple hereditary exostoses pathologic condition, the occurrence of pain, swelling, or ischemia could be considered as a warning sign to vascular complications.

The recurrence of an osteochondroma is extremely rare but has been reported,<sup>17</sup> so if we remove an exostosis, we think echotomography can be a good test to detect its possible recurrence. The problem of a possible recurrence can be related to the decision to operate the exostoses during the childhood because of its potential growth, and it must be mandatory to remove the perichondrium along with the base of the tumor and the perichondrium surrounding it.<sup>18,19</sup>



**Fig 3.** Arteriogram shows filling of pseudoaneurysm and distal patency of popliteal artery.

However diagnosis is clinically made, single radiograph and computed tomographic scan can help to establish anatomic relationships between exostosis, pseudoaneurysm, and artery. Duplex scan can show the shape of the pseudoaneurysm and its filling, with less capability to establish the relationships as computed tomographic scan does, but it must be the test used for any artery next to an osteochondroma. Arteriogram must be performed only if any vascular complication develops, and it is mandatory before surgery.

We repaired the pseudoaneurysm with primary closure because there was a single 1-mm hole in the artery wall, arterial resection was not necessary, and the tumor was easily and completely removed. Other cases reported use of a vein patch for the closure of the artery, and in a few cases, arterial resection with end-to-end anastomosis, vein grafting, or polytetrafluoroethylene bypass has been performed.

In conclusion, despite the low number of popliteal artery complications from femoral exostoses, most of them described by orthopedists, the necessity of the surgical repair<sup>4,5</sup> seems clear because of the high percentage of distal embolization or fast growth of the pseudoaneurysm,

as in our case. Some authors only think about the surgical repair of the exostosis if it becomes malignant,<sup>20</sup> but Vasseur and Fabre<sup>2</sup> propose the indication of surgical resection of osteochondroma if it is next to a major vessel or there is bone fracture or vascular or nervous compression. We think a posterior approach is a good method for the surgeon to make a total exposure of the popliteal vessels and the femoral surface, making easy the mobilization of neurovascular structures in all their lengths and an appropriate arterial repair depending on the size of the wall lesion.

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